

## WHAT IS CLAIMED IS:

1. A system to optimize resource planning for asynchronous digital subscriber line (ADSL) services comprising:
  - 5 a network management system (NMS) in communication with an ADSL network; and  
a computing application, said computing application operating on said network management system capable of allocating, tracking, and managing deterministic resource configuration variables that are used to create permanent virtual circuits (PVCs) on said ADSL network.
- 10 2. The system recited in claim 1, wherein said deterministic resource configuration variables comprise the virtual circuit identifier (VCI) configuration variable.
- 15 3. The system recited in claim 2, wherein said VCI configuration variable is calculated by said computing application using at least one algorithm, said at least one algorithm employing ADSL network values to calculate said VCI configuration variable.
- 20 4. The system recited in claim 3, wherein said ADSL network values comprise any of the following: port position of cooperating remote access multiplexers (RAM) of said ADSL network, the port position of central office digital subscriber line access multiplexer (CO DSLAM) of said ADSL network, the connection position of said cooperating RAMS on said ADSL, and an ADSL network capacity parameter.
- 25 5. The system recited in claim 4, wherein said ADSL network capacity parameter is determined from the range of allowable VCI values that can be allocated on the ADSL network at any one given time.
6. The system recited in claim 5, wherein said ADSL network capacity parameter is determined using VCI values in a range from 33 to 1023.

7. The system recited in claim 1, wherein said NMS cooperates with said ADSL network using an element management system (EMS), said EMS capable of communicating with the ADSL network components using ADSL network component communication protocols and standards.

5

8. The system recited in claim 7, wherein said NMS accepts subscriber information from a service order management system (SOMS) for use in allocating, tracking, and managing said deterministic resource configuration variables for use when creating permanent virtual circuits (PVCs) on said ADSL network.

10

9. The system recited in claim 7, wherein said NMS uses said deterministic configuration variables to reanimate hung permanent virtual connections (PVCs).

10. The system recited in claim 9, wherein said NMS cooperates with said EMS to communicate information indicative of said hung PVCs to said ADSL network components such that said ADSL network components can reanimate said hung PVCs, said NMS calculating said deterministic variables using said computing application to ascertain the connection positions of the PVC on said ADSL network components.

15

11. A method to optimize resources of an ADSL network providing ADSL services comprising the acts of:

(a) providing a network management system (NMS) with the ability to calculate, track, and store deterministic configuration variables used in the provisioning of resources on an ADSL network; and

(b) providing a communication means to allow said NMS to communicate with said ADSL network.

25

12. The method recited in claim 11, wherein act (a) further comprises the act of: providing a computing application to operate on said network management system (NMS), said computing application creating, managing, and communicating deterministic

30

configuration variables to cooperating ADSL network components for the provisioning of resources.

13. The method recited in claim 12, wherein the act of providing said computing application further comprises the act of calculating a virtual circuit identifier (VCI) value, said VCI value being calculated using a plurality of ADSL component configuration data comprising any of connection position information, port information, and sequence position information.

14. The method recited in claim 13, wherein the act of calculating said virtual circuit identifier (VCI) value further comprises the act of reverse engineering resource allocations using said VCI value to ascertain the configuration values of said ADSL network components.

15. The method recited in claim 11, wherein the act of providing said communications means further comprises the act of coupling said NMS to an element management system (EMS), said NMS cooperating with said EMS to communicate said created deterministic configuration variables to said cooperating ADSL components.

16. A computer readable storage medium comprising computer-executable instructions for instructing a computer to perform the acts recited in claim 11.

17. In an ADSL network comprising a network management system (NMS), an element management system (EMS), at least one remote access multiplexer (RAM), and at least one central office digital subscriber line access multiplexer (CO DSLAM) a method to provision resources on said ADSL network comprising the steps of:

calculating deterministic configuration variables by said NMS; and

communicating said calculated deterministic configuration variables to said ADSL network by said NMS using said EMS, said EMS being communicatively coupled to said RAM and CODSLAM.

18. The method recited in claim 17, wherein said calculating step further comprises the step of determining RAM and CO DSLAM configuration values for inclusion in providing said deterministic configuration variables.

5

19. The method recited in claim 18, wherein said determining step further comprises the steps of communicating with said RAM and said CO DSLAM by said NMS through said EMS to obtain said RAM and CO DSLAM configuration values.

10 20. The method recited in claim 17, wherein said calculating step further comprises the steps of determining the capacity of said RAM and said CO DSLAM to ascertain the range of values for said deterministic configuration values for communication by said NMS, and choosing a formula associated with said determined capacity for use in calculating said deterministic configuration values.

15

21. A computer readable storage medium comprising computer-executable instructions for instructing a computer to perform the acts recited in claim 17.

20 22. In an ADSL network having a DSLAM, a plurality of RAMs communicatively connected to said DSLAM, and a plurality of subscribers communicatively connected to said DSLAM by way of said plurality of RAMs, wherein each subscriber is identifiable at said DSLAM by a combination of a virtual circuit identifier (VCI) value and a virtual path identifier (VPI) value, a method of assigning VCI values to a subscriber comprising the acts of:

25 identifying a RAM to which said subscriber is connected;  
assigning a sequence number,  $n$ , to said RAM, said sequence number being based on the DSLAM input port position to which said RAM is connected;  
identifying a port on said RAM to which said subscriber is connected;  
assigning a position number,  $Mpos$ , to said RAM, said position number being  
30 in a range beginning with the number zero, said position number being based on the RAM

input port to which said subscriber is connected;

determining the number of ports,  $P$ , on said RAM;

computing the value  $P*(n-1) + Mpos$ ; and

assigning a VCI value for said subscriber based on the computed value.

5

23. The method of claim 22, wherein  $P$  is equal to 8, and wherein the range of values for  $Mpos$  is zero through seven.

10

24. The method of claim 23, wherein acceptable VCI values are in the range 33-1023, and wherein said assigning step comprises assigning said subscriber the VCI value according to the formula:

$$33 + (n-1) * 8 + Mpos.$$

15

25. The method of claim 25, further comprising the act of determining whether  $n$  is greater than a pre-defined parameter  $X$ .

20

26. The method of claim 25, wherein the computed value is computed based on  $(n-1) \bmod X$  if  $n$  is greater than  $X$ .

27. The method of claim 26, further comprising the act of assigning a VPI value based on whether  $n$  is greater than  $X$ .